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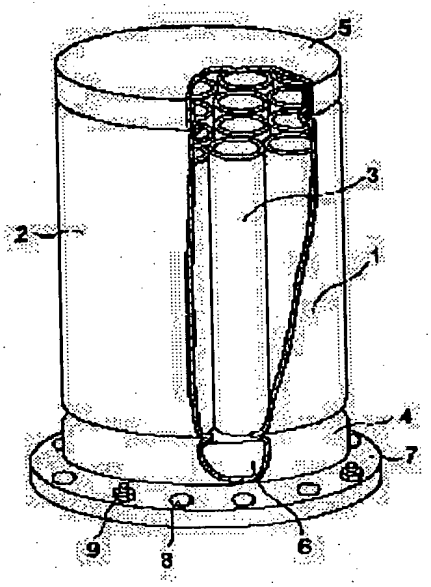
(71)Applicant : MITSUBISHI CHEMICALS CORP
(72)Inventor : TANAKA TOMOHIKO
NAKAMARU MASAFUMI
URASHU IBRAHIM

(54) COLLISION CUSHIONING BODY FOR VEHICLE

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain an excellent cushioning effect, and to simplify installation and attain temporary reuse by forming a collision cushioning body of a shell body composed of a thermoplastic synthetic resin formed in a hollow body having a large diameter and a plurality of expansion pipes housed in the shell body and made of the thermoplastic synthetic resin.
SOLUTION: A plurality of expansion pipes 3 made of a thermoplastic synthetic resin are housed into a shell body 2 and used as a cushioning material, recoverability to deformation is improved, and the cushioning body has properties being difficult to be broken even by deformation. Since the cushioning body abounds in lightweight properties at that time, the cushioning body can be reinstalled even when the shell body 2 is to some extent broken. Consequently, the shell body 2 is also composed of the expansion pipe molded by the same method as the expansion pipes 3 and made of the thermoplastic synthetic resin on strength. A blow molded form comprising a resin such as polyethylene, polypropylene or the like, an extrusion molded form or the like is employed normally on molding. Accordingly, reinstallation is carried out, and the same effect as an effect before a collision cannot be displayed, but temporary use is enabled and the safety of a road can be maintained continuously.



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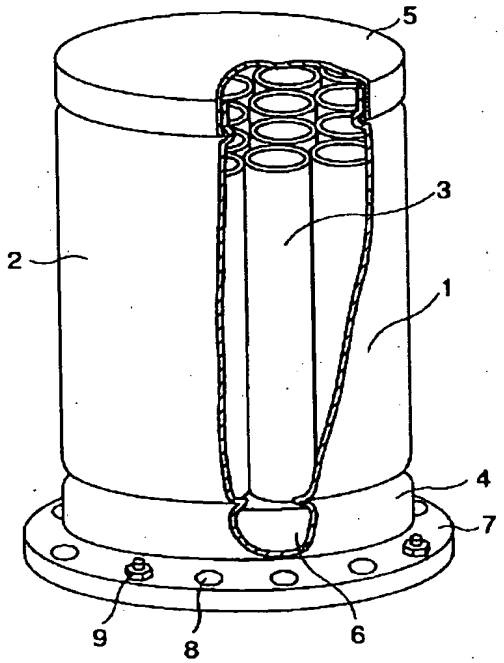
(71)出願人　000005968
三菱化学株式会社
東京都千代田区丸の内二丁目５番２号
(72)発明者　田中　智彦
三重県四日市市東邦町１番地　三菱化学株式会社四日市事業所内
(72)発明者　中丸　雅史
三重県四日市市東邦町１番地　三菱化学株式会社四日市事業所内
(72)発明者　ウラシュ　イブラヒム
神奈川県鎌倉市腰越1542－５　小野　亨方
(74)代理人　100103997
弁理士　長谷川　曉司

最終頁に続く

(54)【発明の名称】　乗物用衝突緩衝体

(57)【要約】
【課題】　自動車等が衝突した際に良好な緩衝効果を有し、設置が簡単で一時的な再使用が可能な乗物用衝突緩衝体を提供する。
【解決手段】　比較的大径の中空体とされた熱可塑性合成樹脂からなる外殻体と、該外殻体に収納された複数本の熱可塑性合成樹脂製延伸パイプとからなる乗物用衝突緩衝体。



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【特許請求の範囲】

【請求項１】　比較的大径の中空体とされた熱可塑性合成樹脂からなる外殻体と、該外殻体に収納された複数本の熱可塑性合成樹脂製延伸パイプとからなる乗物用衝突緩衝体。

【請求項２】　外殻体が熱可塑性合成樹脂製延伸成形体からなる請求項１に記載の乗物用衝突緩衝体。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、乗物用衝突緩衝体に関する。詳しくは、道路の分岐点、中央分離帯、岸壁等に設置され、車両、船舶等の衝突事故における衝撃を吸収緩和させる乗物用衝突緩衝体に関する。

【０００２】

【従来の技術】車両用の衝突緩衝体は、比較的大径の中空体とされた熱可塑性合成樹脂からなる外殻体の内部に水や砂を詰めたものが多く用いられており、また船舶用の衝突緩衝体は、発泡合成樹脂等が用いられている。道路では分岐点に置かれることが多く、進むべき道路を間違え、慌てて進路を変更しようとして分岐点に衝突する車両の衝撃を緩和する目的で設置される。

【０００３】

【発明が解決しようとする課題】しかしながら、この従来型の緩衝体は、例えば外殻体に水を充填したものは、緩衝効果は抜群の性能を発揮するが、外殻体に亀裂等が発生すると中の水が除々抜けてしまい、肝心な衝突時には有効な働きをしなかったり、水の抜けている物が無いかの保守点検も相当な労力、費用が必要となる。また、外殻体の内部に砂を詰めたものは緩衝効果に乏しく、運転者に掛かる衝撃が大きすぎる。また両者共、水や砂といった重量物を用いるため、設置作業に大変な労力が必要となる。本発明は、上記のような問題を解決し、良好な緩衝効果を有し、設置が簡単で一時的な再使用が可能な乗物用衝突緩衝体を提供するものである。

【０００４】

【課題を解決するための手段】本発明の要旨は、比較的大径の中空体とされた熱可塑性合成樹脂からなる外殻体と、該外殻体に収納された複数本の熱可塑性合成樹脂製延伸パイプとからなる乗物用衝突緩衝体に存する。以下、図面を用いて本発明の乗物用衝突緩衝体の一例につき説明する。図１は本発明の乗物用衝突緩衝体の一例の斜視図、図２は加熱延伸装置の縦断面図である。図中１は乗物用衝突緩衝体、２は外殻体、３は熱可塑性合成樹脂製延伸パイプ、４は底部、５は蓋部、６は錘、７はフランジ部、８は固定部、９はボルト１０は加熱筒、１１はダイ、１２は冷却水、１３は冷却槽、１４はシール、１５は内部フォーマー、１６は熱可塑性樹脂管（前駆体）、１７は延伸成形体をそれぞれ示す。

【０００５】本発明の乗物用衝突緩衝体１は外殻体２とその中に収容される特殊な緩衝材から構成される。特殊な緩衝材とは即ち、熱可塑性合成樹脂からなる延伸パイプである。本発明の乗物用衝突緩衝体１の外殻体２を構成する熱可塑性合成樹脂としては、ポリエチレン、ポリプロピレン、エチレン－プロピレン共重合体、ポリスチレン、ポリ塩化ビニル、ポリエチレンテレフタレート、ポリナフタレンテレフタレート、ポリカーボネート、ポリアミド等任意の熱可塑性樹脂が用いられる。成形方法もブロー成形、押出成形、射出成形、回転成形等任意であるが、外殻体２は通常、高さ１．５m程度、直径１m程度の大きさとされるので大型のブロー成形又は回転成形を用いるのが良い。乗物用衝突緩衝体１の中に収容される熱可塑性合成樹脂製延伸パイプ３を構成する熱可塑性合成樹脂としては、結晶性の熱可塑性合成樹脂が好適に用いられる。

【０００６】このような樹脂の好ましいものとしては未置換またはハロゲン置換ビニル重合体、未置換もしくはヒドロキシ置換ポリエステル、ポリアミド、ポリエーテルケトン、脂肪族ポリケトン、ポリオキシメチレン等が挙げられる。より好ましくは、エチレンまたはプロピレンの線状重合体もしくはエチレンまたはプロピレンと少なくとも１種類の他のコモノマーとの線状共重合体、ポリフッ化ビニリデン、ポリオキシメチレンおよびこれらと少なくとも１種類の他のコモノマーとの共重合体が挙げられる。特に好ましいものとしては、エチレンまたはプロピレンの線状重合体もしくはこれらと少なくとも１種類のコモノマーとの線状共重合体が挙げられる。これらの熱可塑性樹脂には、ガラス、カーボンなどの繊維状フィラー、タルク、マイカなどの板状フィラー、あるいは炭酸カルシウム、硫酸バリウム、カーボンなどの粒状フィラーを含有していてもよい。

【０００７】上記した熱可塑性合成樹脂を用い、中空管状の延伸パイプ３とする。中空管状の延伸パイプ３とは円形、角形、楕円形等、の形状のパイプであって、延伸、即ち固相で変形を与え、分子に配向を与えた状態としたものを云う。軸方向および円周方向に延伸管を製造する方法としては、例えば、熱可塑性合成樹脂製パイプ（前駆体）を固相で前駆体の初期内部断面積よりも大きな断面積を有する内部フォーマーを通過させることにより拡径、延伸変形させる方法により得られる。また、他の方法としては特開平２－２５８３２３等に、中空体を膨張成形機を通過させ、中空体を延伸変形させる方法も開示されている。

【０００８】本発明において延伸とは、前駆体を固相の状態、即ち融点温度以下、好ましくは融点－５℃以下、特に好ましくは融点－１０℃以下の温度で前駆体の肉厚を初期肉厚の２５％、好ましくは２０％より小さくするものである。すなわち前駆体の肉厚が１０mmであれば、延伸後のパイプの肉厚を２．５mm以下、好ましくは２mm以下とするものである。肉厚が２５％より大きい場合は、ネッキングが均一に起こらず、肉厚、強度と

もに満足な延伸された熱可塑性樹脂製パイプが得られない。軸方向の延伸とは、前駆体を固相の状態、即ち融点温度以下、好ましくは融点－５℃以下、特に好ましくは融点－１０℃以下の温度で前駆体の長手方向（軸方向）に、前駆体の長さを長くするものである。

【０００９】また、円周方向の延伸とは、前駆体の内径と比較して延伸後のパイプ内径を同じかまたは大きくするもので、例えば前駆体の外径に比べ延伸パイプの外径が小さく、かつ延伸パイプの内径が前駆体の内径より大きくなる場合も含まれる。熱可塑性合成樹脂からなる中空管状の延伸成形体（延伸パイプ）は、前駆体である熱可塑性合成樹脂製パイプを軸方向および円周方向に延伸しつつ冷却固化するか、軸方向および円周方向に延伸を施した後、延伸成形体を熱処理することによって得られる。冷却しつつ軸方向および円周方向に延伸するには、例えば、図２に示した加熱装置１０を用い、熱可塑性合成樹脂製前駆体１６を所定温度まで加熱し、内部フォマー１５とダイ１１を同時に通過させた直後に、冷媒１２が満たされた冷却槽１３を通すような方法を用いれば良い。

【００１０】すなわち、ダイ１１およびフォーマー１５によって二軸延伸された直後のパイプ（管）１７を、一旦冷却することなく冷却槽１３で直ぐに冷却するものである。冷却槽１３と内部フォーマー１５は、図２のように冷却槽１３と重なっていてもよく、また内部フォーマー１５を通過した直後に冷却槽１３を通しても良い。図中１４は冷却水と管１７との間の水密を保つシール材である。冷却手段としては、例えば、水等の液体または空気等の気体を延伸された中空管状の延伸成形体１７の外側から接触させて冷却する手段が挙げられる。冷却に液体を用いる場合は、シールパッキン１４などで冷媒が漏れないような機構を付けた入口と出口を設けた槽１３に冷媒１２を満たした状態で延伸された中空管状の延伸成形体１７を通すか、あるいは冷媒を延伸された延伸成形体１７の表面に噴霧して冷却することができる。

【００１１】また、気体と液体を併用することもできる。また、液体を中に通したゴム・金属等の筒の中に延伸された中空加工物を通すことにより冷却することも可能である。また、熱可塑性合成樹脂からなる中空管状の延伸成形体１７は、例えば図２の装置において冷却槽１３を用いずに成形して得られた熱可塑性合成樹脂製延伸パイプを、オーブン中で該成形体を構成する熱可塑性樹脂の融点－１０℃から融点－２５℃の温度で熱処理することによっても得られる。オーブンで熱処理する場合、処理時間は、１０分以上６０分以内、好ましくは３０分以上６０分以内である。熱処理は外殻体に熱可塑性合成樹脂製延伸パイプを収容し、乗物用衝突緩衝体の形状としてから行っても良い。加熱オーブンは、遠赤外線加熱式、熱風循環式，水槽や蒸気等の加熱媒体槽式のものが目的に応じて好適に用いられる。

【００１２】このような延伸成形体１７は熱処理後も結晶化温度以上の温度に加熱すると大きく収縮する事から延伸（配向）の有無が確認できる。良好な延伸とは通常５％以上収縮するもの、好ましくは７％以上収縮するもの、より好ましくは１０％以上収縮するものを云う。本発明においての収縮率とは、延伸された熱可塑性樹脂成形体（パイプ）をＩＳＯ２５０５の熱可塑性樹脂管長さ復元試験法のＢ法に従い測定した値をいう。延伸後延伸成形体に熱処理を行うと収縮量が小さくなるが、延伸・配向しているか否かは、熱処理した成形体であっても、示差走査熱量計を用いて配向結晶の量を測定すれば確認できる。例えば示差走査熱量計を用い、サンプル（測定したい延伸成形体の切り出し片等）の昇温時の（１次）融解熱量を測定する。次いで、このサンプルを０℃まで冷却し、再度昇温し、（２次）融解熱量をもう一度測定する。この（１次）融解熱量と（２次）融解熱量の比｛（１次）：（２次）｝が１．０１以上のものが良好な延伸状態のものと云うことが出来る。

【００１３】この融解熱量の比｛（１次）：（２次）｝は樹脂の種類によって多少異なり、ポリエチレンの場合は１．０１以上、好ましくは１．０２以上、ポリプロピレンの場合は１．１以上、好ましくは１．１５以上、より好ましくは１．２以上のものが良好な延伸状態のものと云うことが出来る。前駆体となる熱可塑性合成樹脂パイプは、熱可塑性合成樹脂を押出成形したり射出成形したりして形成できる。場合によっては熱可塑性合成樹脂ブロックを切削加工を経てパイプ状にしてもよい。

【００１４】本発明においては、上述の様にして得られた熱可塑性合成樹脂からなる中空延伸パイプ３か管状の延伸成形体を図１に示すように乗物用衝突緩衝体１の緩衝用充填物として用いる、すなわち、外殻体２の内部に熱可塑性合成樹脂製延伸パイプ３を複数本収容して緩衝材とする。外殻体２に熱可塑性合成樹脂製延伸パイプ３を収容する本数は熱可塑性合成樹脂製延伸パイプ３の肉厚、延伸程度等により変わるが、通常は３～３０本程度が考えられる。熱可塑性合成樹脂製延伸パイプ３はそれらの全て、もしくは熱可塑性合成樹脂製延伸パイプ３の複数本、少なくとも３本以上を結合具を用いたり、互いに溶着したりして連結一体化してあることが、衝撃を全てのパイプ３に分散する上で望ましい。

【００１５】勿論、熱可塑性合成樹脂製延伸パイプ３と外殻体２とを連結一体化しておくことも衝撃を分散する上で望ましい。更に、本発明の乗物用衝突緩衝体１は軽量であり輸送に便利なことも特徴の一つであるが、軽量な乗物用衝突緩衝体１は、道路等に置いただけでは車両等が衝突した場合に跳ね飛ばされてしまい緩衝体として働かないので、ある程度固定の必要がある。固定は、外殻体２を道路等にボルト９等の機械的手段により固定したり、外殻体２の底部４に錘６用として砂や水を少量詰めても良い。外殻体１の底部４にフランジ部７等を設

け、これに多数の固定用開口等の固定部８を形成しておけば、固定部８の一部が破損しても他の開口（固定部）を用いて固定可能である。蓋部５は上部から異物が入るのを防止する。

【００１６】緩衝材として熱可塑性合成樹脂製延伸パイプ３を用いる理由は、このパイプが変形に対する回復性が極めて高く、かつ変形はしても破壊しにくい（割れにくい）性質を有し、軽量性に富むためである。特に、屈曲に対して特異の耐久性を示す。自動車が衝突しても本発明の乗物用衝突緩衝体の熱可塑性合成樹脂製延伸パイプ３は大抵破壊されることなく押しつぶされた状態となり、しかも回復力も大きい。この性質は材質が熱可塑性合成樹脂であること、熱可塑性合成樹脂が延伸状態にあること及び形状を中空管状としたことの組み合わせにより達成される。不慮の事故で乗物用衝突緩衝体１に車両等が衝突した場合、従来の乗物用衝突緩衝体１は回復不可能な状態まで破壊されてしまう。乗物用衝突緩衝体１が衝撃を十分に吸収する設計とされているものなので、当然のことである。事故発生後、事故処理は速やかに行われるが乗物用衝突緩衝体１の取り替えまで速やかに行うのはなかなか難しい。

【００１７】特に、水を充填した乗物用衝突緩衝体は水が抜けてしまうので、再使用は不可能である。近年、交通網の発達から、車両の数が多すぎ、事故処理が長引けば膨大な渋滞を引き起こすので事故処理は可能な限り速やかに行わなければならず、道路等の原状復帰も勿論である。しかし、乗物用衝突緩衝体の再設置をその場で行うのは難しい。乗物用衝突緩衝体が設置されている場所は他よりも事故の起こる可能性のある場所であるから、この問題は極めて大きい。

【００１８】本発明の乗物用衝突緩衝体１は外殻体２の内部に熱可塑性合成樹脂製延伸パイプ３を複数本収容して緩衝材としており、この熱可塑性合成樹脂製延伸パイプ３は上述したように変形に対する回復性が極めて高く、かつ変形はしても破壊しにくい（割れにくい）性質を有し、軽量性に富むため外殻体２がある程度破壊されても再設置が可能である。勿論衝突前と同等の効果を発揮することはできないが、一時的な仮の使用は可能であり、道路の安全を連続して（一時的に途切れることなく）維持するという極めて大きい効果を奏する。本発明の乗物用衝突緩衝体１は外殻体２と熱可塑性合成樹脂製延伸パイプ３からなるが、強度上、外殻体２も内部に収容される延伸パイプ３と同様の方法で成型された熱可塑性合成樹脂製延伸パイプ（成形体）から構成されることが望ましい。しかし、外殻体２は径の大きな成型品とならざるを得ない。このような大径の延伸成形体は成形することが難しいので、通常はポリエチレン、ポリプロピレン等の樹脂からなるブロー成型品、押し出し成型品等が用いられる。

【００１９】

【実施例】以下に実施例を示すが、本発明はその要旨を越えない限り以下の実施例に限定されるものではない。

実施例１

ポリエチレン樹脂（密度：０．９４８ｇ／ｃｍ^3、ＭＦＲ：０．０５ｇ／１０分）を押し出し成形し、外径６０．１ｍｍ、内径２７ｍｍ、長さ２．３ｍの管状前駆体を得た。図２に示した装置（内部フォーマーは半頂角１５°最大外径８０ｍｍの円錐部をゆうするものを設けた）を用いた。内部フォーマーを１２０℃に加熱し、加熱状態にある管状前駆体を内部フォーマーに装着し、熱的に安定状態になるまで放置した。前駆体を延伸速度１００ｍｍ／分で延伸し、外径８０ｍｍ、内径７５．６ｍｍの中空管状の延伸成形体を得た。この成形体から長さ８５０ｍｍの延伸パイプを９本切り出した。同様の操作を４回繰り返し、計３６本の延伸パイプを得た。延伸パイプの軸方向の加熱収縮率（長さ２００ｍｍのサンプルを１５０℃の恒温槽に６０分自由状態に保持、加熱収縮後のサンプル面積を元のサンプル面積で割った値（％表示）は１３％であった。

【００２０】また、ＤＳＣで測定した（１次）融解熱量と（２次）融解熱量の比｛（１次）：（２次）｝は１．０１であった。外殻体は超高分子量高密度ポリエチレン製ドラム缶（外径５９０ｍｍ、高さ９００ｍｍ、最小内径５６０ｍｍ、実容量２０４リットル）を転用して用いた。この外殻体の上部を切断し、上述の延伸パイプ３６本を挿入し、切断した蓋部を溶着して乗物用衝突緩衝体を得た。得られた乗物用衝突緩衝体を図３に示すガイドレール（１８Ａ、１８Ｂ）付の円柱鋼材落下試験装置で耐衝撃性を試験した。鋼材１９の重量は１００Ｋｇとし、高さは６．３ｍから自然落下させた。目視観察したが、外殻に変形は観察されたが、破損はなかった。

【００２１】比較例１

実施例１で用いた外殻体に延伸パイプを入れずに、水を充填した。重量が２００Ｋｇを越え、移動に大変手間が掛かった。これを図３の装置を用いて、実施例１と同様に耐衝撃性を試験した。外殻体胴部に亀裂が入り、中の水が流出した。

【００２２】

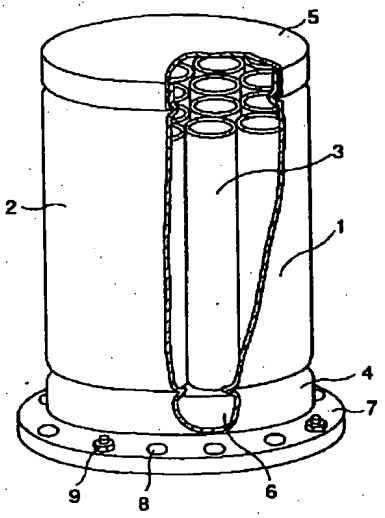
【発明の効果】本発明の乗物用衝突緩衝体は、良好な緩衝効果を有し、設置が簡単な乗物用衝突緩衝体であって、特に、緩衝材である熱可塑性合成樹脂製延伸パイプは変形に対する回復性が極めて高く、かつ変形はしても破壊しにくい（割れにくい）性質を有し、軽量性に富むため、衝撃により外殻体がある程度破壊されても再設置が可能である。衝突前と同等の効果を発揮することはできないが、一時的な仮の使用は可能であり、道路の安全を連続して（一時的に途切れることなく）維持するという極めて大きい効果を奏する等実用上大変優れた乗物用衝突緩衝体である。

【図面の簡単な説明】

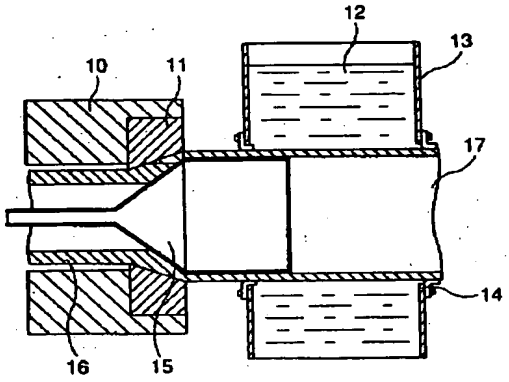
7　　8

【図１】本発明の乗物用衝突緩衝体の一例の斜視図
【図２】加熱延伸装置の縦断面図
【図３】円柱鋼材落下試験装置の概略図
【符号の説明】
1　乗物用衝突緩衝体
2　外殻体
3　熱可塑性合成樹脂製延伸パイプ
4　底部
5　蓋部
6　錘
7　フランジ部
8　固定部
9　ボルト
１０　加熱筒
１１　ダイ
１２　冷却水
１３　冷却用水槽
１４　シール
１５　内部フォーマー
１６　熱可塑性樹脂管（前駆体）
１７　延伸成形体

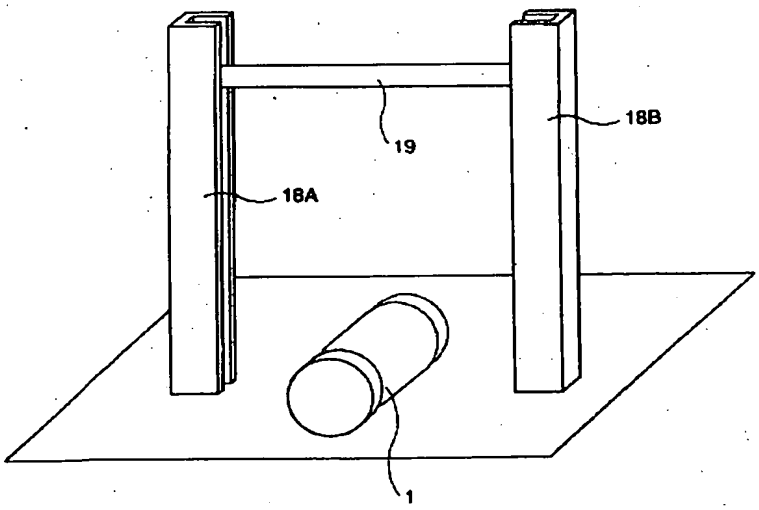
【図１】



【図２】



【図３】



フロントページの続き

Ｆターム(参考) 2D101 CA04 DA05 EA01 FA00 FB02
GA03 GA15 GA17
3J066 AA16 AA23 BA04 BB01 BB04
BC01 BD05 BF02

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the collision buffer for vehicles. In detail, it is installed in the branch point of a route, a median strip, a quaywall, etc., and is related with the collision buffer for vehicles which carries out absorption relaxation of a collision thing, therefore the impacts which can be set, such as vehicles and a marine vessel.
[0002]
[Description of the Prior Art] Many things which packed water and sand are used for the interior of the coat object which consists of thermoplastic synthetic resin with which the collision buffer for vehicles was comparatively used as the hollow object of a major diameter, and, as for the collision buffer for marine vessels, foaming synthetic resin etc. is used. It is put on the branch point in the road in many cases, and it is installed in order to ease the impact of the vehicles which are mistaken in the route which should progress, are going to change a track confusedly, and collide at the branch point.
[0003]
[Problem(s) to be Solved by the Invention] However, the work at the time of the important collision which inner water will not ********** if a crack etc. occurs on a coat object although a buffer effect demonstrates the preeminent engine performance with that effective with which the buffer of this conventional type filled up water for example, into the coat object is not carried out, or an effort also with considerable maintenance inspection of whether there is any object which has escaped from water, and costs are needed. Moreover, what put sand in the interior of a coat object is deficient in a buffer effect, and its impact concerning an operator is too great. Moreover, in order that both may use heavy lifts, such as water and sand, a serious effort is needed for installation. This invention solves the above problems, has a good buffer effect, and offers the collision buffer for vehicles in which a reuse easy [installation] and temporary is possible.
[0004]
[Means for Solving the Problem] A summary of this invention consists in a collision buffer for vehicles which consists of a coat object which consists of thermoplastic synthetic resin comparatively used as a hollow object of a major diameter, and two or more drawing pipes made of thermoplastic synthetic resin contained by this coat object. Hereafter, it explains per example of a collision buffer for vehicles of this invention using a drawing. Drawing 1 is the perspective diagram of an example of a collision buffer for vehicles of this invention, and drawing 2 is drawing of longitudinal section of heating drawing equipment. one in drawing -- a collision buffer for vehicles, and 2 -- a coat object and 3 -- a drawing pipe made of thermoplastic synthetic resin, and 4 -- a pars basilaris ossis occipitalis and 5 -- a covering device and 6 -- weight and 7 -- a flange and 8 -- a fixed part and 9 -- a bolt 10 -- a heating cylinder and 11 -- a die and 12 -- in a seal and 15, an internal former and 16 show a thermoplastics pipe (precursor), and, as for cooling water and 13, 17 shows [a cooling pool and 14] a drawing Plastic solid, respectively.
[0005] The collision buffer 1 for vehicles of this invention consists of a coat object 2 and special shock

absorbing material held into it. It is the drawing pipe which consists of special shock absorbing material, i.e., thermoplastic synthetic resin. As thermoplastic synthetic resin which constitutes the coat object 2 of the collision buffer 1 for vehicles of this invention, thermoplastics of arbitration, such as polyethylene, polypropylene, ethylene propylene rubber, polystyrene, a polyvinyl chloride, polyethylene terephthalate, poly naphthalene terephthalate, a polycarbonate, and a polyamide, is used. Although shaping methods are also arbitration, such as blow molding, extrusion molding, injection molding, and rotational casting, since the coat object 2 is made into about height 1.5m and about [diameter 1m] magnitude, it is usually good. [of using large-sized blow molding or rotational casting] As thermoplastic synthetic resin which constitutes the drawing pipe 3 made of thermoplastic synthetic resin held into the collision buffer 1 for vehicles, crystalline thermoplastic synthetic resin is used suitably.

[0006] As a desirable thing of such resin, un-replacing or a halogenation vinyl polymerization object, un-replacing or hydroxy substitute polyester, a polyamide, a polyether ketone, an aliphatic series poly ketone, polyoxymethylene, etc. are mentioned. more -- desirable -- a line of a linear polymer of ethylene or a propylene, ethylene or a propylene, and at least one kind of other comonomers -- a copolymer of a copolymer, polyvinylidene fluoride, polyoxymethylene and these, and at least one kind of other comonomers is mentioned. as an especially desirable thing -- a linear polymer of ethylene or a propylene, or a line of these and at least one kind of comonomer -- a copolymer is mentioned. In these thermoplastics, granular fillers, such as tabular fillers, such as fibrous fillers, such as glass and carbon, talc, and a mica, or a calcium carbonate, a barium sulfate, and carbon, may be contained.

[0007] It considers as the hollow pipe-like drawing pipe 3 using the above-mentioned thermoplastic synthetic resin. Circular, a square shape, an ellipse form, etc. are the pipes of a configuration of ** in the hollow pipe-like drawing pipe 3, and what was made into the condition of having given deformation by drawing, i.e., solid phase, and having given orientation to a molecule is said. By, for example, making shaft orientations and a circumferencial direction pass an internal former which has the bigger cross section than the interior cross section of a primary stage of a precursor for a pipe made of thermoplastic synthetic resin (precursor) by solid phase as a method of manufacturing a drawing pipe, the diameter is expanded and it is obtained by method of carrying out drawing deformation. Moreover, as other methods, JP,2-258323,A etc. is made to pass an expansion molding machine for a hollow object, and a method of carrying out drawing deformation of the hollow object is also indicated.

[0008] In this invention, a drawing is a desirable thing thick the first stage made smaller than 20% below a condition of solid phase, i.e., melting point temperature, 25% about thickness of a precursor at temperature with a melting point of -10 degrees C or less especially preferably the melting point of -5 degrees C or less preferably in a precursor. That is, if thickness of a precursor is 10mm, thickness of a pipe after a drawing will be preferably set to 2mm or less 2.5mm or less. When thickness is larger than 25%, necking does not take place to homogeneity and an extended pipe made of thermoplastics with satisfactory thickness and reinforcement is not obtained. A drawing of shaft orientations lengthens the length of a precursor for a precursor below a condition of solid phase, i.e., melting point temperature, at temperature with a melting point of -10 degrees C or less preferably especially the melting point of -5 degrees C or less at a longitudinal direction (shaft orientations) of a precursor.

[0009] or [moreover, / that a drawing of a circumferencial direction is the same in a pipe bore after a drawing as compared with a bore of a precursor] -- or it enlarges, and it is contained also when an outer diameter of a drawing pipe becomes [for example, / a bore of a drawing pipe] larger than a bore of a precursor small compared with an outer diameter of a precursor. A drawing Plastic solid (drawing pipe) of the shape of a hollow pipe which consists of thermoplastic synthetic resin is acquired by heat-treating a drawing Plastic solid, after carrying out cooling solidification or extending to shaft orientations and a circumferencial direction, extending a pipe made of thermoplastic synthetic resin which is a precursor to shaft orientations and a circumferencial direction. What is necessary is just to use a method which lets the cooling pool 13 with which a refrigerant 12 was filled immediately after having heated the precursor 16 made of thermoplastic synthetic resin to predetermined temperature, and passing internal FOMA 15 and a die 11 simultaneously using the heating apparatus 10 shown in drawing 2 in order to extend to shaft orientations and a circumferencial direction, cooling pass.

[0010] That is, the pipe (pipe) 17 immediately after carrying out biaxial stretching with a die 11 and a former 15 is immediately cooled by cooling pool 13, without once cooling. A cooling pool 13 and the internal former 15 may let a cooling pool 13 pass immediately after having lapped with a cooling pool 13 like drawing 2 , and passing the internal former 15. 14 in drawing is a sealant which maintains a watertight between cooling water and a pipe 17. A means to contact as a cooling means from an outside of drawing Plastic solid 17 of the shape of a hollow pipe which had gases, such as liquids, such as water, or air, extended, for example, and to cool is mentioned. When using a liquid for cooling, it can spray on a front face of drawing Plastic solid 17 which had a refrigerant extended by the tub 13 which prepared an entrance which attached a device in which a refrigerant did not leak by the seal packing 14 etc., and an outlet through drawing Plastic solid 17 of the shape of a hollow pipe extended where a refrigerant 12 is filled, and can cool.
[0011] Moreover, a gas and a liquid can also be used together. Moreover, it is also possible to cool by letting a hollow work extended in cylinders, such as rubber, a metal, etc. which let a liquid pass to inside, pass. Moreover, drawing Plastic solid 17 of the shape of a hollow pipe which consists of thermoplastic synthetic resin is acquired also by heat-treating a drawing pipe made of thermoplastic synthetic resin fabricated and obtained, without using a cooling pool 13 in equipment of drawing 2 at temperature with a melting point [of thermoplastics which constitutes this Plastic solid out of oven / the melting point of -10 degrees C to] of -25 degrees C. When heat-treating in oven, the processing time is less than 60 minutes less than 60 minutes 10 minutes or more 30 minutes or more preferably. Heat treatment holds a drawing pipe made of thermoplastic synthetic resin in a coat object, and after considering as a configuration of a collision buffer for vehicles, it may be performed. As for heating oven, a thing of heating-medium tub types, such as a far-infrared-heating type, a hot blast circuit system, a cistern, and a steam, is suitably used according to the object.
[0012] If such drawing Plastic solid 17 heats after heat treatment to temperature beyond crystallization temperature, it can check existence of a drawing (orientation) from contracting greatly. What is usually contracted 5% or more, a thing contracted 7% or more preferably, and a thing contracted 10% or more more preferably are called good drawing. Contraction in this invention means a value which measured an extended thermoplastics Plastic solid (pipe) according to B of the thermoplastics pipe length reload examining method of ISO2505 law. If it heat-treats to a drawing Plastic solid after a drawing, the amount of contraction will become small, but even if it is the heat-treated Plastic solid, if an amount of an orientation crystal is measured using a differential scanning calorimeter, it can check [a drawing and] whether orientation is carried out. For example, the amount of heat of fusions (1st order) at the time of temperature up of samples (logging piece of a drawing Plastic solid to measure etc.) is measured using a differential scanning calorimeter. Subsequently, this sample is cooled to 0 degree C, temperature up is carried out again, and the amount of heat of fusions (2nd order) is measured once again. A ratio {(1st order) : (2nd order)} of this (1st order) amount of heat of fusions and the amount of heat of fusions (2nd order) can call it a thing of a drawing condition with 1.01 or more good things.
[0013] A ratio {(1st order) : (2nd order)} of this amount of heat of fusions changes somewhat with classes of resin, and, in the case of polyethylene, in the case of 1.02 or more and polypropylene, it can be preferably called a thing of 1.15 or more and a more desirable drawing condition with 1.2 or more good things 1.1 or more 1.01 or more. A thermoplastic synthetic-resin pipe used as a precursor can carry out extrusion molding of the thermoplastic synthetic resin, or injection molds it, and can form it. Depending on the case, a thermoplastic synthetic-resin block may be made into the shape of a pipe through cutting.
[0014] In this invention, the hollow drawing pipe 3 or a pipe-like drawing Plastic solid which consists of thermoplastic synthetic resin obtained as mentioned above is used as packing for a buffer of the collision buffer 1 for vehicles, as shown in drawing 1 , i.e., two or more drawing pipes 3 made of thermoplastic synthetic resin are held in the interior of the coat object 2, and it considers as shock absorbing material. Although a number which holds the drawing pipe 3 made of thermoplastic synthetic resin changes to the coat object 2 with thickness of the drawing pipe 3 made of thermoplastic synthetic resin, a drawing degree, etc., about 3-30 can usually be considered. As for the drawing pipe 3 made of thermoplastic

synthetic resin, it is desirable to use a joint implement, or to weld mutually two or more [of those all or the drawing pipe 3 made of thermoplastic synthetic resin] and at least 3 or more, and to have carried out connection unification, when distributing an impact to all the pipes 3.

[0015] Of course, it is desirable when carrying out the connection unification of the drawing pipe 3 made of thermoplastic synthetic resin and the coat object 2 also distributes an impact. Furthermore, although it is one of the features that the collision buffer 1 for vehicles of this invention is lightweight, and it is also convenient to convey, since the lightweight collision buffer 1 for vehicles will bound off when vehicles etc. collide, and it does not work as a buffer only by putting on a route etc., it has the need for immobilization to some extent. Little ****** of immobilization is also good for the pars basilaris ossis occipitalis 4 of the coat object 2 in sand or water as an object for weights 6 in fixing the coat object 2 to a route etc. by mechanical means of bolt 9 grade. If flange 7 grade is prepared in the pars basilaris ossis occipitalis 4 of the coat object 1 and the fixed parts 8, such as many openings for immobilization, are formed in this, even if a part of fixed part 8 is damaged, it is fixable using other openings (fixed part). A covering device 5 prevents that a foreign matter enters from the upper part.

[0016] A reason using the drawing pipe 3 made of thermoplastic synthetic resin as shock absorbing material has very high recoverability [as opposed to deformation in this pipe], and a browning form is because it has a property which is hard to destroy even if it carries out (it is a pile to a crack) and is rich in lightweight nature. Especially, unique endurance is shown to crookedness. Even if an automobile collides, the drawing pipe 3 made of thermoplastic synthetic resin of a collision buffer for vehicles of this invention will be in the condition of having been crushed without being destroyed mostly, and, moreover, its recuperability is also large. that this property has that construction material is thermoplastic synthetic resin and thermoplastic synthetic resin in a drawing condition, and a configuration -- hollow -- it is attained by combination of having presupposed that it is tubular. When vehicles etc. collide with the collision buffer 1 for vehicles by unforeseen accident, the conventional collision buffer 1 for vehicles will be destroyed to an unrecoverable condition. Since the collision buffer 1 for vehicles is considered as layout which fully absorbs an impact, it is natural. After the occurrence of accident, although accident processing is performed promptly, it is rather difficult to carry out promptly to exchange of the collision buffer 1 for vehicles.

[0017] Since water escapes especially from a collision buffer for vehicles filled up with water, a reuse is impossible. In recent years, from development of a transportation network, since huge delay will be caused if there are too many vehicles and accident processing is prolonged, accident processing must be performed as promptly as possible and an original-state return of a route etc. is also natural. However, it is difficult to reinstall a collision buffer for vehicles on that spot. Since a location in which a collision buffer for vehicles is installed is a location where accident may happen rather than others, this problem is very large.

[0018] The collision buffer 1 for vehicles of this invention holds two or more drawing pipes 3 made of thermoplastic synthetic resin in the interior of the coat object 2, and is considering as shock absorbing material, and this drawing pipe 3 made of thermoplastic synthetic resin can reinstall it, even if recoverability over deformation is very high as mentioned above, and the coat object 2 is destroyed to some extent, since a browning form has a property which is hard to destroy even if it carries out (it is a pile to a crack) and is rich in lightweight nature. Although an effect equivalent to collision before cannot be demonstrated, of course, a temporary temporary activity does so a very large effect of it being possible, and maintaining safety of a route continuously (without breaking off temporarily). Although the collision buffer 1 for vehicles of this invention consists of a coat object 2 and a drawing pipe 3 made of thermoplastic synthetic resin, also as for the coat object 2, it is desirable on reinforcement to consist of a drawing pipe 3 held in the interior and a drawing pipe made of thermoplastic synthetic resin (Plastic solid) cast by same method. However, the coat object 2 cannot but serve as a big cast of a path. Since fabricating is difficult for a drawing Plastic solid of such a major diameter, a blow molding article, a knockout cast, etc. which usually consist of resin, such as polyethylene and polypropylene, are used.

[0019]

[Example] Although an example is shown below, this invention is not limited to the following examples,

unless the summary is exceeded.
Extrusion molding of the example 1 polyethylene resin (density: 0.948 g/cm3, 10 MFR:0.05g /, minutes) was carried out, and the tubular precursor with the outer diameter of 60.1mm, a bore [of 27mm], and a length of 2.3m was obtained. The equipment (the internal former prepared what **** the cone section with a 15 degree maximum outer diameter [of half-vertical angles] of 80mm) shown in drawing 2 was used. The internal former was heated at 120 degrees C, and the internal former was equipped with the tubular precursor in a heating condition, and it was left until it would be in the stable state thermally. The precursor was extended by part for 100mm/in drawing speed, and the drawing Plastic solid of the shape of a hollow pipe with an outer diameter [of 80mm] and a bore of 75.6mm was acquired. Nine drawing pipes with a length of 850mm were cut down from this Plastic solid. A total of a repeat and 36 drawing pipes was obtained for the same actuation 4 times. Heating contraction of the shaft orientations of a drawing pipe (the value (% display) which divided the sample area after maintenance and heating contraction into the 150-degree C thermostat by the original sample area for the sample with a length of 200mm for 60 minutes at the free condition was 13%.)
[0020] Moreover, the ratio {(1st order) : (2nd order)} of the amount of heat of fusions (1st order) measured by DSC and the amount of heat of fusions (2nd order) was 1.01. The coat object diverted to some other purpose and used the drum made from ultrahigh-molecular-weight high density polyethylene (the outer diameter of 590mm, a height of 900mm, the minimum bore of 560mm, net volume of 204l.). The upper part of this coat object was cut, 36 above-mentioned drawing pipes were inserted, the cut covering device was welded and the collision buffer for vehicles was obtained. Shock resistance was examined with the cylinder steel drop test equipment with a guide rail (18A, 18B) which shows the obtained collision buffer for vehicles to drawing 3 . Weight of steel 19 was set to 100kg, and natural drop of the height was carried out from 6.3m. Although visual observation was carried out, and deformation was observed by the coat, there was no failure.
[0021] It was filled up with water, without putting a drawing pipe into the coat object used in the example of comparison 1 example 1. Weight exceeded 200kg and migration took time and effort very much. Shock resistance was examined for this like the example 1 using the equipment of drawing 3 . The crack went into the coat object drum section, and inner water flowed out.
[0022]
[Effect of the Invention] The collision buffer for vehicles of this invention has a good buffer effect, and since a browning form has the property which is hard to destroy even if it carries out (it is a pile to a crack) and is rich in lightweight nature, even if installation is an easy collision buffer for vehicles, especially the drawing pipe made of thermoplastic synthetic resin that is shock absorbing material has the very high recoverability over deformation, and a coat object is destroyed to some extent by the impact, it can reinstall. Although an effect equivalent to collision before cannot be demonstrated, doing so the very large effect of a temporary temporary activity being possible, and maintaining safety of a route continuously (without breaking off temporarily) etc. is the collision buffer for vehicles which was very excellent practically.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
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CLAIMS

[Claim(s)]
[Claim 1] A collision buffer for vehicles which consists of a coat object which consists of thermoplastic synthetic resin comparatively used as a hollow object of a major diameter, and two or more drawing pipes made of thermoplastic synthetic resin contained by this coat object.
[Claim 2] A collision buffer for vehicles according to claim 1 which a coat object turns into from a drawing.Plastic solid made of thermoplastic synthetic resin.

[Translation done.]

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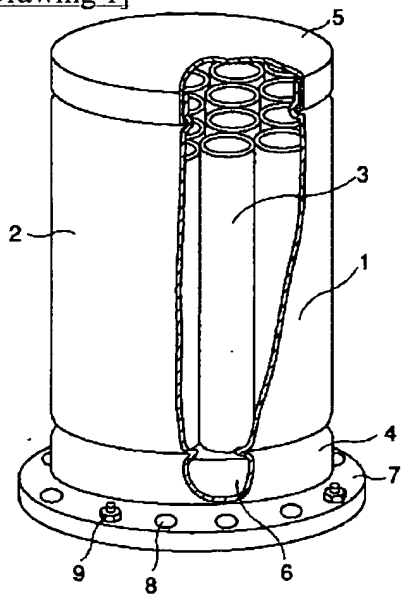
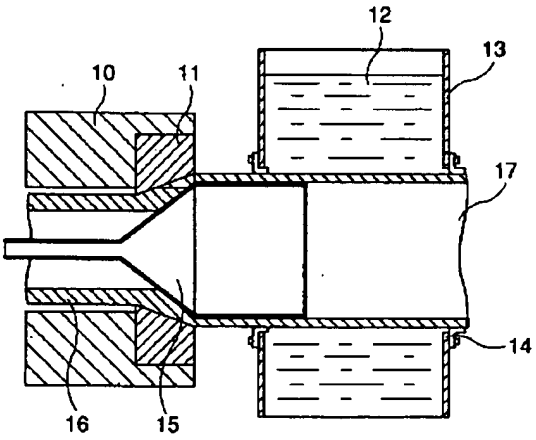
DRAWINGS

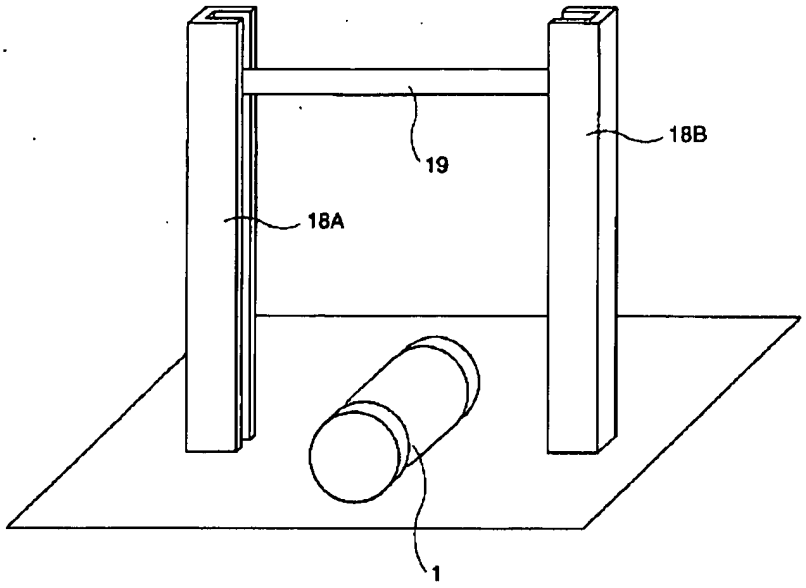
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]